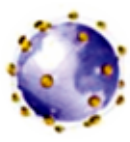




# SATELLITE BROADBAND & DIGITAL INDIA



**Broadband  
India  
Forum**

...enhance, expand & unleash the true value of broadband

**13<sup>th</sup> DECEMBER, 2017**

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# EXECUTIVE SUMMARY

Globally, the satellite industry is growing by leaps and bounds. The overall space market is about US\$ 323 Billion, of which nearly 40% is for commercial communications. The rest are for various strategic segments like scientific, military, navigation, earth observation etc. There are about 1400 satellites in operation, of which 37% are commercial communication satellites. India's share in the communications satellites is far below its need for achieving Digital India. There is a serious mismatch between supply and demand. As per the Chairman, ISRO & Secretary, DOS, India has less than 50% of the satellite capacity it needs. While India is currently making excellent progress in the strategic segments, we are lagging behind in the commercial communications segments. Indian satellites are still operating in the Ku band and are low capacity platforms in the Gigabits range whereas the world moved to higher capacity and more efficient Ka band over 2 decades ago and, unlike us, is using and launching High Throughput Satellites (HTS) in the range of 100s of Gigabits.

There is considerable spare capacity, in the range of 10Gbps, over the visible Indian arc, which if gainfully exploited, will meet some of the capacity shortfall to begin with and can be suitably harnessed to deliver affordable, reliable and ubiquitous broadband all across the country. Progressively through open competition and by way of introduction of new and innovative technologies - viz. use of Ka band, HTS satellites, LEO/MEO Satellite con-

stellations - satcom user tariffs could be brought down substantially.

India is a vast country consisting of Hostile Hilly terrain, Islands and remote areas. It is an established fact that it would cost many more times to connect the last 10-20% population of any country, especially a country as diverse as India with many remote and far flung areas. Satellite communication helps connect this last 10-20% population in a very cost-effec-



tive way. Satellites can not only cover remote and inaccessible areas but can also bring reasonable Broadband services quickly to many other areas where Optical Fiber based services would take some time to reach. Satcoms can be used to create points of presence for distribution of capacities by wireless or wireline in the last mile radii of 50 to 100 kms. Satcoms are an excellent substitute until conventional means of connectivity arrive. They could either be redeployed or used as standby connectivity even after more conventional connectivity is deployed.

Satellite Communications for islands and remote areas have been used since late 70s-early 80s in India. Their efficacy needs no further authentication. The satellite service providers have an installed base of more than 250,000 terminals. They serve as the communication backbone to the banking industry, large distributed enterprises, small and medium businesses that are dependent on the internet for conducting their business (including filing of

GST returns). The telecom service providers use satellite as a backhaul medium to expand their coverage to the rural, remote and difficult to reach areas, in particular the islands; and lastly the Government itself for the rollout of various social initiatives. The Government can do its bit to un-lock this potential by tweaking its policies and provide the much-needed impetus to the sector for providing the last mile connectivity to the unconnected. .

India has reached a point of inflexion where it simply needs to accelerate the penetration of accessible, available

and affordable broadband to all to provide the power and usefulness of the Internet to all its 1.3 Billion citizens so as to digitally empower them and act as a catalyst to transform their lives. History has demonstrated that Connectivity is virtuous, be it by land, sea or air and now cyber. With the present level of 20% broadband penetration all our lofty goals and targets of achieving Digital India, Smart Cities, 100% Financial Inclusion and others shall remain un-fulfilled. Should there be no availability of true broadband to all its 1.3 Billion citizens, as articulated by Union Telecom Secretary Madam Aruna Sundararajan, we would be depriving our citizens of a powerful tool to grow, summing up she added "Digital Transformation is not a luxury but a dire necessity today." It is in this context that the Role of the upcoming NTP 2018 becomes very significant

and important. Among the several areas which NTP needs to focus on, is the Role that Satcom can play in providing affordable, accessible and always available broadband to not just the far flung, rural and remote areas of our country but in equal measure to enterprise sector besides government offices.

Broadband India Forum (BIF) has been working for the cause of proliferation of broadband and sees immense potential in the use of satellite as a medium for broadband and for acceleration of Government's Digital India program. One of its Core beliefs is that we need to unlock the true potential of Satellite Communications, not just by gainfully exploiting the spare capacities over the visible Indian Arc but also by pro-active space policy as matter of urgent priority.

Unlike the Mobile Telephony Proliferation which was based on a single technology/media, it is clear that in a vast and diverse country like India, 100% broadband penetration cannot be achieved with a single technology or media and that a combination of multiple technologies and media would be required depending on the terrain, the environment and the distance from the mainland. One of the most useful but much neglected technologies that could help connect, especially the far flung, remote and inaccessible areas could be Satcom. With new technologies and innovations in satellite communication that are currently available, India could leapfrog to a new broadband penetration level not just by connecting remote areas but also be able to offer an affordable choice of access to customers in urban areas as well. ■

## PREFACE

Hon'ble PM of India's Digital India vision includes the fundamental premise that affordable broadband access shall be available throughout the country including the rural areas. There isn't any country in the world that couldn't benefit from the advances in satellite broadband. India, with its vast geographical expanses and huge population, is a shining example of a market that is ripe for Satcom. Broadband satellites are proliferating in

the region, and High throughput satellites are providing bandwidth that can not only fill gaps in terrestrial infrastructure but also provide competitive broadband infrastructure in an expeditious manner. Satcom can play in transformation of the Broadband space and to review policies and regulations for active deployment of Satcom based applications & solutions for the overall growth of broadband in the country. ■



# ROLE OF SATCOM IN DIGITAL INDIA

In mobile telephony, India has been the envy of many countries. While analogue mobile telephony was well-developed and operational in many countries including our neighboring ones since the mid-1980s, India had no mobile telephony. However, when GSM digital telephony was commercialized even in Europe only in 1993, India, with remarkable foresight, took a giant leap to mandate GSM in its first mobile telephony licenses in 1994 and 1995. The rest is history. In the 20 years since, despite many trials and tribulations on the way, we have become the world's second largest mobile market and probably the fastest growing, with intense competition and lowest user tariffs. Truly a success story.

However, for an inclusive DIGITAL INDIA we have to deliver connectivity and broadband to the remote and difficult-to-access parts of the country, such as Jammu and Kashmir, Assam, the Northeast, Chhattisgarh, Andaman and Nicobar Islands, Lakshadweep, and rural hinterland and Naxalite areas in various states. It is estimated that there are 38,000 gram panchayats which fall into this category. In view of the formidable challenges in rolling out expensive digital networks in remote parts, the digital divide between urban and rural India is actually widening—the 'digital haves' are getting more while the 'digital have-nots' remain excluded.



## Digital India consists of nine pillars:

1. Broadband Highways
2. Universal Mobile Access
3. Public Internet Access Programme
4. E-Governance: Reforming Govt through technology
5. E-Kranti – Electronic Delivery of Services
6. Information for all
7. Electronics Manufacturing – Target Net Zero Imports
8. IT for Jobs
9. Early Harvest Programme

Satellite communication has significant role in all the pillars of Digital India. Government's 'Digital India' programme envisions to "transform India into a digitally empowered society and knowledge economy". Providing reliable broadband connectivity is one of the key backbones of the Digital India project, which aims to

provide connectivity to unconnected. Satellite communication can play an active role in providing high speed access to gram panchayats for the BharatNet program, in rural mobile coverage over satellite, eGovernance services like NREGA, JDY and NRHM to remote areas where terrestrial connectivity cannot reach. ■

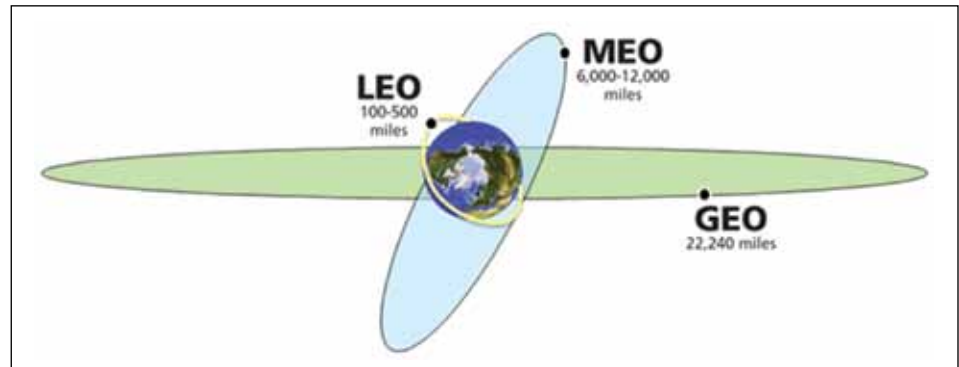
# SATCOM INNOVATIONS: NEW TECHNOLOGIES AND IOT

With advanced technology on the ground and in space, satellite service providers are meeting the broadband needs of rural and urban populations, the oil and gas industry, maritime markets, emergency management, education, civil and military government and more. New Innovation in Satellite Technologies like Ka and Ku band High Throughput Satellites with spot beams and frequency reuse, Non Geo Satellite (NGS) constellations, flexible payloads, flat panel antennas and a host of other developments are making broadband available and affordable throughout the developed world.

HTS Ka/Ku band satellites are optimized for delivering broadband services. The HTS capacity varies between 5-300 Gbps today, with even 1000Gbps (1 TB) Satellites being built, with frequency reuse in multiple spot beams. Since the cost of HTS satellite is the similar to that of a regular wide beam satellite, the cost per Mbps is by far lower and thus optimized for Broadband services. The inherent delays associated with Geo-stationary satellites, HTS or otherwise, has paved the way to a new breed of satellites: the NGSO (Non Geo Stationary Orbit). Originally the commercial NGSO satellites were aimed to provide voice services mainly due to very low latency, however gradually as more and more data services requirements appeared, new business models for NGSO satellites have appeared.

The new HTS NGSO constellations require lots of developments such

as: swarm manageability, steerable beam flat antenna systems on the ground, and low cost satellites in order to make the business case viable.



The current global commercial LEO/MEO constellations are: Iridium, Globalstar, Orbcomm, O3B whereas the ones in planning are the constellations such as: OneWeb, SpaceX and Leosat.

## Internet of Things (IoT) :

Another field of innovation which shall attract a lot of interest and investment is IOT. IOT refers to the devices, other than computers and smartphones, connected to the Internet. Despite the roll-out of terrestrial networks to many parts of the world, there are many regions that remain unconnected which rely on satellite connectivity. Satellite technology has a key role in enabling new applications and business processes that are making the IoT a reality.

Cisco report predicts 50Bn devices of IOT are likely to be deployed by 2020 and the NSR 2016 report on IOT predicts around 4.7Bn devices globally. Satcom based IOT links would be around 9.5% out of total number of links. By 2020, Deloitte believes indus-

tries such as utilities, manufacturing, automotive, transportation and logistics are expected to see highest adoption levels of IoT in India.

## Satcom Mobility: Planes, Ships, trains and the Connected Cars

Satellite communications is ideal where terrestrial technologies cannot be implemented or as an early fast deployment strategy. Broadband services on planes and on ships can be provided only by satellite. Broadband on trains can be provided by terrestrial communication as well, however it depends on the train route. For India, which has the largest railways tracks many of the routes don't have terrestrial communication coverage and thus satellite communication is the only solution to provide seamless connectivity.

India has one of the largest number of commuters in the world. As for Indian Railways there are 23 million passengers daily on board trains. India saw the highest growth in the world of domestic air passenger traffic in 2016 (23.3% double than in China). A 100Mn passengers flew in domestic flights in 2016 which means around 275,000 passengers a day. As



per Directorate General Civil Aviation (DGCA) there are 6Mn passengers on board domestic flights between Delhi and Mumbai, which makes the Delhi–Mumbai route one of the busiest in the world.

Since 2014, Prime Minister Narendra Modi emphasized the importance of developing ports to address the surge in trade volumes. The government plans to mobilize an investment of Rs 1 lakh crore in the port sector to more than double port capacity to 3,000 million tonnes by 2025.

Combining the data of growing commuters on planes, ships and trains as well as growing demand for Internet usage the conclusion is quite obvious as for need of mobile connectivity on these platforms.

As satellite communications is the principal means of communication to enable connectivity services on these platforms, this is a big business potential for Satcom.

The regulatory environment in India which is highly regulated is a ma-

jor challenge in using new innovative satellite technologies in delivering new services to the Indian market. To unleash the power of satellite communication, India needs to revisit its Satcom policy. A liberal Satcom policy would help achieve the objectives quickly and also bring about wider participation by global service providers creating competition and lowering of tariffs thus increasing the much-needed affordability and bringing about penetration of broadband in rural areas and would help in meeting the objectives of Digital India. ■



Double port capacity to  
**3,000 MILLION**  
tonnes by 2025



India has one of the  
**LARGEST NUMBER**  
of commuters in the world



**100MN**  
passengers flew in  
domestic flights in 2016



# SUGGESTIONS FOR MAKING SATELLITE BROADBAND VIABLE

## 1. Open the Supply of Satellite Capacity

- A. The NTP 99 was a big milestone for the VSAT industry opening up the Ku Band and allowing foreign satellites to augment the domestic capacity. The NTP 99 recognized the consultative role of DoS in the satellite space. However, this consultative role over time has become a canalizing role for DoS/Antrix in providing capacity. This has led to a number of issues that are impeding the growth of the satellite broadband industry. DoS is a licensor, regulator and service provider, which leads to many conflicts of interest.
  - B. Open the supply of satellite capacity from private players aimed to ease the way of doing business and making the latest and innovative technology available to all at an affordable cost. Like in all other sectors, the Government should be involved in facilitating the growth and development of the sector.
  - C. Open competition must be allowed into the sector by permitting direct contract between the service providers and suppliers of satellite capacity based on the requirement without presence of any intermediary.
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## 2. Remove artificial barriers that are impeding the growth of the industry

- A. The TEC IR Document (TEC/IR/SCB-08/03.Oct 2013) restricts the speed of broadband via satellite to 2 Mbps. These licensing barriers are artificial in nature especially when satellites world over can deliver upwards of 50-100 Mbps to a subscriber. . . Ideally, the ground network should be allowed to optimally use the satellite resources to maximize the utility for the end-users.
  - B. Similarly, the licensing conditions need to be agnostic to bands and satellite orbital locations. All bands that are permitted by the ITU for India should automatically be adopted for satellite broadband.
  - C. The licensing and regulation needs to be an enabler and not a dampener. All artificial barriers restricting use of new technologies from being deployed in the country should be done away with. Availability of technology should be the only limiting factor. This will pave way for lower cost satellite broadband that will be affordable for all.
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## 3. Allow VSAT Services to be provided without any restrictions and in any combination across India, irrespective of whether the service is - to extend voice and broadband services to consumers and businesses in remote areas, and/or to provide backhaul services to Telecom Service Providers or ISPs, and/or part of a larger hybrid telecom network service provided to an enterprise through a Telecom Service Provider

- A. The VSAT service providers should be allowed to offer backhaul services to the other Telecom Service Providers without the need for a separate NLD license and set-up.
- B. At the same time, a satellite based communication service can cost-effectively deliver broadband along with voice to a small or medium business in the underserved or un-served areas. Such a service should be allowed on VSATs.
- C. Simplify the SACFA/WPC compliance by making it a self-certification. For the gateways, provide a time bound and single window clearance not exceeding 60 days from the date of application. This will result in a much faster roll out of the service and reduction of costs which will help bring down the cost of the service.

#### **4. De-license the VSAT terminals so that the import/local manufacturing and sale of terminals can be easily done.**

The biggest inflection point for the growth of mobiles came in when the Government decided to de-license the mobile handset.. Today, satellite is yet another wireless alternative. In many countries, satellite terminals are in homes, very similar to a DSL/Cable/FTTH modem/equipment. This sort of a revolution is only possible when the Government de-licenses the terminal itself. This means, the terminal can be easily imported and deployed. Also going forward, local manufacturing should be facilitated in the area of VSAT terminals also.

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#### **5. Expand the scope for existing Service Providers so that they can grow the market and proliferate satellite Broadband access across the SAARC countries**

The Hon'ble Prime Minister has a great vision to donate a satellite developed by India to the SAARC countries. With a gateway in India, VSAT service providers can expand their scope by providing services to customers in the SAARC countries without the need for an International Long Distance license.

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#### **6. All uplink teleports for broadcast services should be permitted to plan for contingencies such as natural disasters by entering into arrangements with similar facilities located in other jurisdictions and transponders on alternate satellites respectively.**

It's a universally accepted fact that satellite based communications services including broadcast can be very effective medium to transmit useful information to large populations in case of any natural disaster/emergencies.

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#### **7. Inclusion of Broadcasting Satellite Service (BSS) Plan Frequency bands so as to augment the total satellite capacity available over India**

It is recommended that Broadcast services to be moved to BSS Plan bands that have been languishing without use in India (spectrum is wasted when not used) so that FSS Plan bands can be freed for VSAT communications. There is artificial scarcity created in the FSS Plan bands due to this.

## **CONCLUSION**

Satellite Communication can play a big role in India's ambition to transform itself into a country empowered by digital technologies. With the available foreign and indigenous satellite capacity over India, within 18 months, all the 150,000 GPs of Bharat Net Phase II can be connected. The satellite connectivity can be maintained till these GPs will be connected with optical fiber. Satellite communication is the only way to connect remote villages with cellular connectivity. Satellite communication is the major technology to connect commuters on trains, airplanes and ships. Satellite communication can be a major enabler for Digital Money in rural India as connectivity to ATMs and

micro ATMs. Satellite communication based classroom is a crucial facility for "e-education & skilling" pillar in Digital India. New Satellite Technologies like HTS Ka/Ku satellite over India with a combination of Non Geo Satellites such as Leo and MEO satellites are crucial to provide affordable Satellite Broadband Services in India. But to unleash the power of Satellite communication we need to have liberal Satcom policy. A liberal Satcom policy would help in faster adoption of new technologies in India and help in providing high speed reliable connectivity not just in cities but reaching the end points of the country at affordable prices Thus meeting the objectives of Digital India. ■

# DISCLAIMER

**T**his report has been produced under one of BIF's thrust areas - "Broadband including Telecommunications and Satellite Communication". This work adds to the considerable stock of carefully crafted empirical evidence generated by BIF under this theme and we hope it will add to the keen policy discourse on the Internet that is ongoing in India.

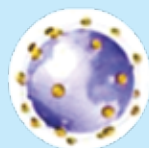
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